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PROGRESS

OF

NAVAL ARCHITECTURE.

To those interested in improvements in Steam, and other Navigation, and to the public generally, this Pamphlet is respectfully addressed,

BEING A POPULAR AND BRIEF

EXPLANATION OF THE PRINCIPLES AND ADVANTAGES

OF

DARIUS DAVISON'S

New American Model,

FOR

OCEAN STEAMERS, CLIPPER SHIPS, STEAMBOATS, YACHTS, ETC.

ILLUSTRATED WITH FIFTEEN NEAT WOOD ENGRAVINGS.

Containing, also, a communication in relation to his

NEW ENGINE AND NEW MOTIVE POWER!

And a general explanation of his plan for a great

IRON OCEAN-STEAMER, 700 FEET LONG!

MAXIMUM SPEED, 30 MILES AN HOUR!

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PRICE 25 CENTS.

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The Steamship "Columbia" in a heavy sea.

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NEW YORK:
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1852.

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PREFACE.

It affords the writer great pleasure in being able to introduce *tangibly* to the notice of the public, one of the important features of the improvements he has made in the model, design, construction, and propulsion of vessels for ocean or inland navigation, as illustrated and shown in part as relates to the design and model by the cuts herein contained, and by the Lithographic Drawings, Diagrams, Models, and Boats to be seen at our office, whereby a greater speed is to be obtained, together with economy of construction and propulsion, &c., than have ever before been realized on the ocean or rivers.

It has been the case heretofore from the earliest periods, that upon the introduction to the public of new ideas in Science, Religion, or Politics, as well as new devices in Mechanism and the Arts, a strong opposition has often been raised to their adoption, practical application, and use, principally, however, from the ignorant, the prejudiced, or from existing and long established interests, which such changes come in contact with and oftentimes wholly displace and ruin. Therefore it would not be surprising to the writer, if the changes he proposes to make from the preconceived and adopted ideas, of the best forms and ways of modeling, constructing, and propelling vessels, should meet with a like opposition from the same sources and causes. But he thinks the social and commercial interests of the world too much in need of such improvements and changes as he proposes to make, and the spirit of the age, especially in this country, too liberal and ready for the acceptance and sustainment of new truths, principles, and improvements, as well as eager to lay hold of new and profitable enterprises, to apprehend any serious opposition, even from the ignorant, the prejudiced, or the interested; more especially when the importance and value of the writer's improvements, inventions, and discoveries are considered in a social and commercial point of view. And further, the writer does not shrink from the severest scrutiny of his improvements, inventions, and discoveries, and of the principles upon which they are founded; but, on the contrary, desires such scrutiny from naval architects, engineers, and

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ship-builders, as well as from the public generally, as he has full assurance, from the practical trials and tests he has made, as to the successful application and great utility of all his improvements. And the writer has the means of demonstrating to the understandings of those qualified to judge, as well as to the public generally, who carefully examine the subject and the facts of the case, that the results he sets forth as attainable can be easily reached by the means proposed, and proved by the clearest calculation, evidence, and experiments to be absolutely certain.

There are certain features in the model, construction, and propulsion of vessels for inland or ocean navigation, especially the latter, which I think all will agree should not be lost sight of in the race of improvements, viz.: STRENGTH, SAFETY, and DURABILITY; after these follow economy of construction and propulsion, speed, style and elegance of finish, decoration, &c.; and the writer would here state that he has kept these objects constantly and distinctly in view, in their proper relation to each other, during the progress of originating and perfecting his improvements.

The writer has devoted the most of his time during the last ten years to originating and perfecting his improvements, being impelled by a strong necessity in the action of his mind, in opposition to the advice of friends, to the neglect of other important business, and the total rejection and abandonment of great pecuniary advantages from other sources, being sustained and encouraged in his arduous and protracted labors connected therewith by the certain conviction of ultimate success and reward to flow therefrom, adequate to the labor bestowed and results attained when presented to the public and put into use. And it affords the writer pleasure to inform the public that he has not been under the necessity of soliciting one dollar from any person to try his improvements. They have been fully tested by him already, and he intends to make further and more extensive tests, at his own expense; nor does he expect that capital will be used in this channel of improvement and enterprise except on the most thorough conviction of its great profit, certainty of success, and *vast practical utility*.

DARIUS DAVISON.

New York, September 1st, 1852.

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INTRODUCTION.

ABOUT twelve years ago, in studying the principles of the propulsion of vessels on the water, and the resistance the water offers to their rapid movement, I perceived that there were two principal forces opposing each other; one, the action of the water resisting the rapid movement of the vessel by its force of gravity, inertia, and friction upon the sides and bottom of the vessel, the other, the power applied, either by sails or steam or other motive power, to overcome that resistance. And on the relation caused to exist in any given vessel, between the resistance of the water to the rapid movement of such vessel and the power applied to overcome such resistance, depended its speed. From observations and experiments on boats then in use, the fact was established in my mind, that in vessels of any certain form of model then and now in use, when power was applied to a certain extent, a certain maximum speed was obtained; and no matter how great the increase of power applied after a certain maximum speed, the increase of speed did not keep pace with the proportionate subsequent increase of power, sufficient to justify such increase on any given vessel, where no change had been made in her model or size. And, therefore, any attempted increase of speed on such vessels, by increasing the power, strength, weight and cost of machinery, and increased cost and weight of fuel as in steam vessels, would necessarily sink the vessel deeper in the water, and thereby increase the resistance in displacing the water, increase the expense of running the vessel, and consequently defeat the object aimed at by the very means employed to overcome it. This fact being apparent to my mind, I saw at once it was useless to attempt to gain any far greater speed by any increase of power, on the old models, as such increase of power as before stated would necessarily involve increased cost and weight of machinery, and increased expense and weight of fuel to be carried.

On mature reflection, it appeared to me, that to gain any great increase in speed, a great change must be made in the model of the vessel, by which we could get the greatest possible floating capacity, and consequent light draft of water with the easiest possible water lines, and thereby meet the least possible resistance in forcing the vessel rapidly through the water.

To get these easy water-lines, together with great floating capacity, it becomes apparent that vessels must be built of an increased length of hull

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in proportion to any given breadth of beam, over any vessel then or now in use. The question then arose what was the best plan of constructing the hull, to give it this additional length, and avoid the disadvantages of such increased length on the old plan of modeling and construction. After much reflection, calculation, and experiment, it became apparent that great length of keel, and thereby proportionately easier water-lines, without a proportionate increase of the upper part of the hull of the vessel, was the only and true plan. For by this means the lightest possible structure would be obtained with a given amount of material, and the greatest possible strength in proportion to the size of the vessel as compared with vessels of a similar length of keel, built on any other known model. And would have the greatest possible buoyancy, and consequently light draft of water and easy water-lines by the more acute angle of divergence of the water-lines from the bow to the broadest beam, and more acute angle of convergence of the water-lines from the broadest beam to the stern, which would lessen the resistance of the diminished draft of water to be displaced by the rapid movement of such proportionately long vessel, to about one-third less than any model heretofore used.

From a multitude of experiments and facts open to the observation of every person, it has now become a well settled principle, especially in the minds of the most experienced ship builders, that the longer a boat is built on the water lines, whether for the ocean or rivers, with any given breadth of beam, when compared with a boat of the same breadth of beam but shorter on the water lines, that the vessel longest on the keel, from its greater buoyancy and lighter draught, and from offering less resistance in the water to its rapid movement, will run the fastest by the application of any given proportionate amount of power, as compared with the smaller sized boat. This principle, as to length, being so well established and conceded, the whole question then turns upon the point whether, upon the plan of model and construction which I propose, vessels can be built longer on the water lines, either for the ocean or rivers, and possess advantages as to lightness of structure, strength, durability, safety, capacity, diminished first cost, &c. &c., not attainable in vessels of a similar capacity and cost built on any other known model. If I clearly establish this I shall have gained my point, and shall claim the advantage to arise therefrom. The following may be set down as a fixed principle in the construction of vessels, viz:—That size in vessels is a measure of useful capacity, strength, power, and speed, and all other things being equal, a large vessel can be run faster than one of a smaller size, of precisely similar proportions; and that the length and proportionate size at which any vessel should be built, especially for the ocean, ought only to be limited by the strength of materials, as formed, proportioned, and combined in the construction of such vessel.

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THE COMPARATIVE ADVANTAGES OF LONG AND SHORT BOATS, BRIEFLY EXPLAINED.

To illustrate in a striking manner the comparative advantages of a vessel with say 50 feet beam and 250 feet keel, as compared with a vessel 50 feet beam and 500 feet keel, we will refer to the diagram in page 8 marked Fig. 1. The lines C. B. C. B., represent one half the length of a vessel 50 feet beam and 250 feet keel, and the angle of divergence of the lines in a straight line from C. the bow to B. B. the broadest beam. The lines A. E. B., and A. F. B, represent the angle of divergence of the lines of a vessel 500 feet keel, and 50 feet beam, from A., the bow, to B. B., the broadest beam. Now, suppose the point C. to be advanced to the point A., in one second of time, then a cubic foot of water (which is taken to represent the body of water to be displaced by the movement of the boat) on each side of the point C. would be forced to the point G. and the point H., being the space of 50 feet equal to the space from B. to B. Now, suppose the point A. to be at the point C. and to be advanced from the point C. to A. at its present position in one second of time, a cubic foot of water each side of the point C. would be forced to the lines E. and F., just 25 feet, being one half the distance of the former instance, both in the same length of time, viz. 1 second,—the point C. having been moved to A., and the point A. having been supposed to be moved from C. to A. its present position. The distance which the points A. and C. have been supposed to be moved being equal, and the time in which they were supposed to have been moved an equal distance being equal, and the distance which two cubic feet of water are supposed to have been moved in one instance having been 25 feet from the line F. to E., and in the other instance having been moved 50 feet from G. to H., being just double the distance of the former instance, it will be evident to every person acquainted with the law controlling the power required to move a body possessing weight a given distance in a given time, that inasmuch as two cubic feet of water were moved in one instance 50 feet in one second, and that in the other instance it was moved but 25 feet in one second, the power required to move two cubic feet of water 50 feet in one second will be four times as great as that required to move the same body of water 25 feet in one second. Therefore, a boat 50 feet beam and 250

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Fig. 1

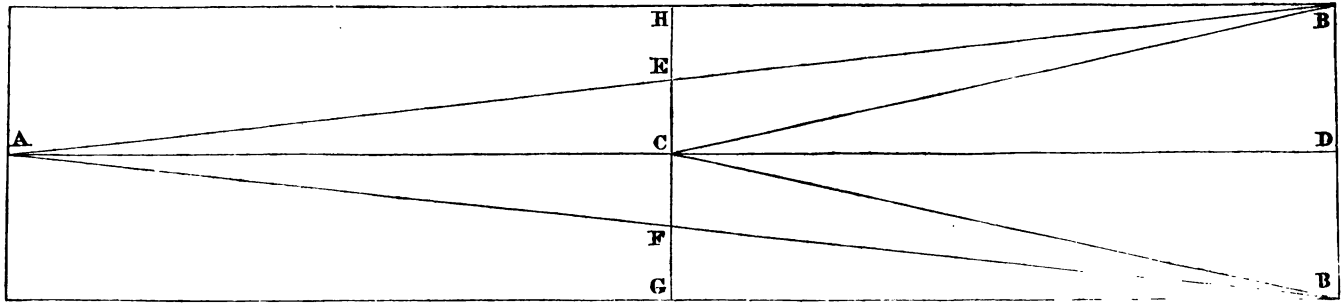

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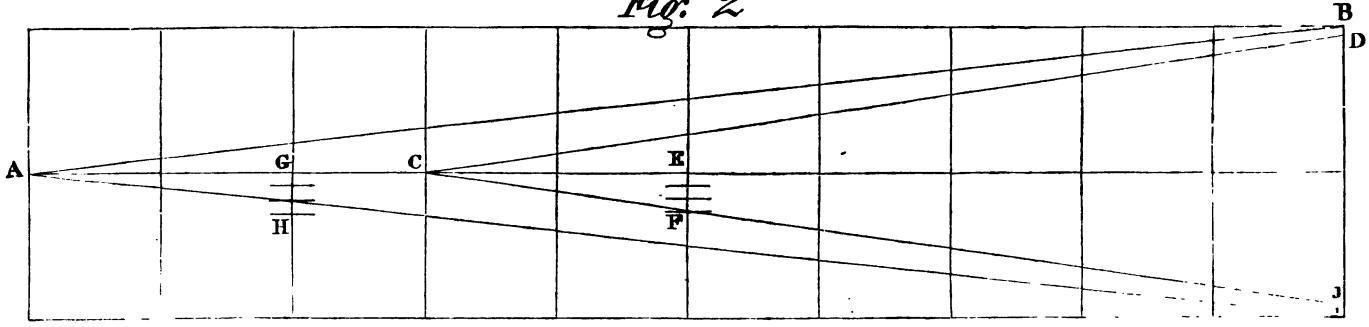
Fig. 2



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feet keel, would require four times the power to move it a given distance at a high rate of speed as would be required to move a boat 50 feet beam and 500 feet keel, the same distance in an equal space of time.

The foregoing illustration being admitted as true, it will be conceded at once, that the longer a boat is built on the keel, having a certain proportionate breadth of beam, the faster it can be made to run, as compared with a boat of the same breadth of beam and shorter on the keel, from the fact that the angle of divergence of the water lines is easier, or more acute, in one instance than in the other, and therefore the resistance of displacing the water is proportionately diminished, and the speed of the vessel thereby proportionately increased with any given amount of power.

Again, it is a physical impossibility to draw a line from C. to B. in fig. 2, that shall diverge from the point C. at so acute an angle in a straight line as a line drawn from the point A. to B. will diverge; and hence the advantage of a long boat over a short one in easy water lines and consequent diminished resistance in running rapidly.

In figure 2, page 8, a comparison is made between the water lines of the proposed steamer, General Washington, for the Hudson river, and the water lines and proportionate breadth of beam, and length of keel, of one of the largest steamers now running on the Hudson river,—showing the relative angle of divergence of the water lines, in a straight line, and the proportionate resistance the shape of each vessel would offer to the easy displacement of the water. The lines C D and C J represent the angle of divergence of the water lines of one half the length of one of the present Hudson river steamers, 350 feet keel and 40 feet beam. The lines A. B. and A. I. represent the angle of divergence of the water lines, of one half the length from the bow to the broadest beam, of the proposed Hudson river steamer, General Washington, 500 feet keel and 50 feet beam. By moving a body of water, a given distance, in a given time, it will require a power proportionate to the distance moved, and when moved a greater distance in the same length of time, will require an increase of power proportionate to the distance moved, as explained in the last diagram. So, it will be seen at a glance on figure 2, that if the point C be moved from E to C, the distance of 50 feet, in one second of time, a cubic foot of water at E would be moved to the third line F, a distance say of 9 feet. And that if the point A be moved from G to A, a distance also of 50 feet, in one second of time, a cubic foot of water at the center line G would be moved, not to the third line H the same distance as in the other instance, but only two lines or 6 feet, being one-third less distance in the same length of time, thereby diminishing the resistance of the water in being displaced in the proportion before explained in impeding the equally rapid movement of the two vessels compared. And, consequently, with a

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proportionate power, the speed of the long vessel must be increased over that of the shorter vessel. The lines from C to D and from A to B may be fashioned, curved, and swelled, from the bow to the broadest beam of each vessel, just as may suit the views of the builder as to the easiest curves for the water line. And yet the average angle of divergence of the water lines so curved between the points C and D and A and B will be the same as in the straight line, viz:—6 degrees in one instance, and 8 degrees in the other. As the angle of divergence of the water lines in a straight line measures the resistance a boat will meet in moving rapidly through the water, it will be readily seen that it is a physical impossibility to make a water line from the bow to the broadest beam of a vessel that will displace the water as easily between the points C and B, vary it as you will, as can be made between the points A and B, and therefore the longest boat will necessarily meet with less proportionate resistance in being moved rapidly through the water than the shorter boat, by the law and principles before explained.

By the two foregoing diagrams the action and proportionate resistance of the water upon the sides of the vessel from the bow to the broadest beam has been explained; and it is only necessary to suppose these two diagrams reversed, and then to represent the hull from the broadest beam to the stern, and the same proportionate advantage is gained there in diminishing the "drag" of the water after the vessel, which so much tends to impede its rapid movement, as is well known to every person acquainted with the action of a boat upon the water in leaving it easily by gently running water lines at the stern.

From the increased length of keel, by which the resistance of displacing the water, is greatly diminished, as before explained, by the easy running water lines from the bow to the broadest beam, and by which we increase the support and reaction in replacing the water from the broadest beam to the stern, by the gently running water lines, giving more time for the water to settle against and react upon the stern sides of the vessel and thereby tend to press it forward; we increase the capacity of burden of the vessel for a given amount of material used in constructing the hull in its proportionate lightness of structure, increased length, and increased breadth of beam, by which the vessel will draw less water in proportion to her capacity for freight and passengers; weight and cost of machinery and boat, than can be had in a vessel of equal capacity, built on any other known model, as is shown by the comparative calculation made between the hull of the steamer General Washington and the hull of one of the largest boats now on the Hudson river, as represented in figure 2, page 12.

The curved lines embraced within the points A A A A, represent the hull of the General Washington, at the water line. The curved lines embraced

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within the points B B B B, represent one of the Hudson river steamers at the water line, being calculated at 40 feet beam and 350 feet keel.

At 4½ feet depth of draught the present Hudson river steamers would displace about 35,000 cubic feet of water. At 2½ feet depth of draught of water, the proposed steamer General Washington, for the Hudson river, would displace about 37,000 cubic feet of water In one instance, to get a floating capacity of 35,000 cubic feet of water, the vessel has to sink 4½ feet deep, and in the other instance to get a floating capacity of 37,000 cubic feet of water, the vessel has to sink but 2½ feet deep in the water, a remarkable difference in favor of the large vessel. To get this great floating capacity at 2½ feet depth of draught in a vessel 500 feet long, we are obliged to increase the breadth of beam, from 40 feet up to 50 feet, as compared with the present Hudson river steamers, yet with this increased breadth of beam, from the proportion ately greater length of keel, we have an easier angle of divergence of the water lines, in the proportion of six degrees to eight degrees, as shown in figure 2, page 8.

Figure 1, page 12, represents the horizontal section of the hull of the steamer General Washington at the water lines, and represents the outline of the guards and wheels, and the model and proportionate extension of the bow and stern beyond the main deck. A A A A A A water line; B B B B outline of the guards; C C wheels; keel, 500 feet; deck, 350 feet; beam, 80 feet; extreme width, 50 feet.

As to Friction.

The steamer General Washington at 3 feet depth of draught of water would expose 15,000 superficial feet of surface for the water to act upon by friction; of this amount of surface 3,000 feet would be upon the sides of the hull, and 12,000 feet upon the bottom. A Hudson river steamer 40 feet beam, 350 feet keel, and drawing 4½ feet of water, would expose 11,000 superficial feet of surface for the water to act upon by friction; of this amount of surface 3,250 feet would be upon the sides of the hull, and 7,750 feet upon the bottom of the hull. Now, as pressure increases with depth, it will be seen at once, that as a column of water one inch square and one foot high weighs about half a lb. that a column of water one inch square and four and a half feet high would weigh two and a half lbs., consequently every square foot of surface of the bottom, of 144 square inches each, would receive a pressure of 360 lbs., which would make an aggregate pressure upon the whole bottom of 2,790,000 lbs. The 3,250 feet of side surface of the 350 feet steamer would receive an average pressure upon every square foot of surface, by the weight of the water, of 180 lbs., which would make an aggregate pressure upon the whole sides of 585,000 lbs., making together with the preceding amount of pressure upon the bottom surface, an aggregate pressure upon the whole surface of the hull, exposed to the action of the water, of 3,375,000 lbs., to produce friction and resist the movement of the vessel.

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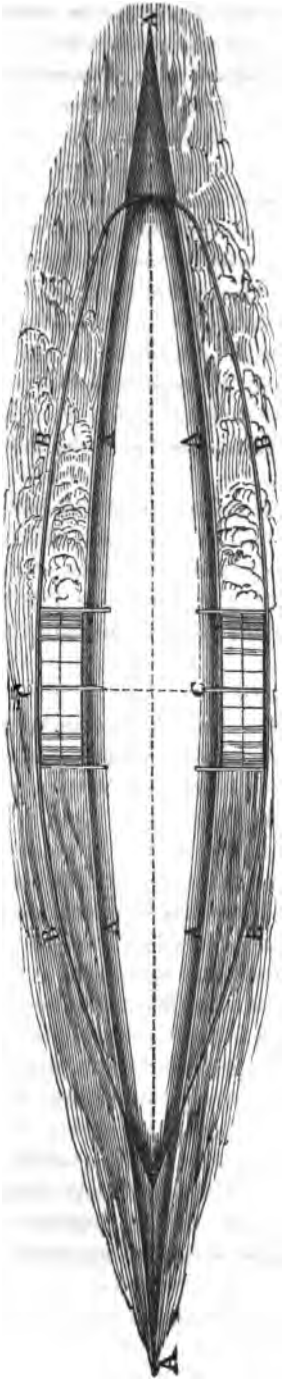

Fig. 1

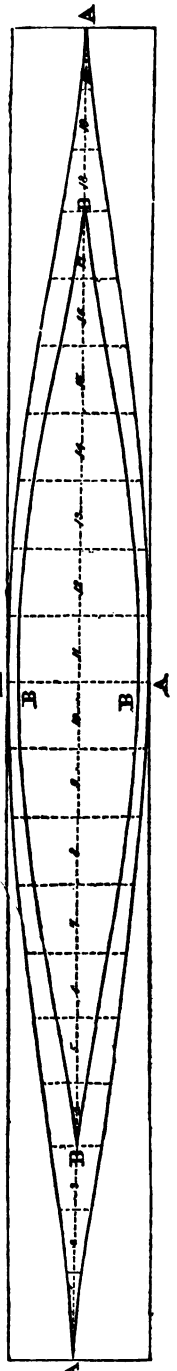

Fig. 2

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The pressure upon every superficial foot of surface of the bottom of the steamer General Washington, at three feet depth of draft, by the same data of calculation as before used, would produce a pressure upon every superficial foot of the bottom surface of 216 lbs., which would make an aggregate pressure upon the 12,000 feet of bottom surface of 2,592,000 lbs. And the average pressure upon every superficial foot of the 3,000 feet of side surface produced by the weight of the water when the boat was at rest, would be 108 lbs. per foot, being 345,000 lbs. pressure upon the side surface; this amount of pressure, taken with the pressure upon the bottom surface, would make an aggregate pressure upon the whole surface of the hull exposed to the action of the water of 2,937,000 lbs., to produce friction and resist the movement of the vessel. Friction upon the surface of a vessel depends in part upon the pressure of the water against the surface exposed to its action, and partly upon the rapidity with which such surface passes in contact with the water, and partly upon the smoothness of such surface.

There is another point as to friction relatively considered in the two vessels, not touched upon in the above calculation, viz., that produced on the sides of the vessel from the bow to the broadest, by the violent pressure of the water in being displaced when the vessel is running rapidly. The vessel whose water-lines or sides diverge from the bow to the broadest beam at the most obtuse angle, when running at a given speed with a boat of more acute diverging sides, will, by pressing the water more rapidly out from the sides of the boat, on the principle before explained, receive more pounds pressure per superficial foot, and therefore more friction upon those surfaces to resist the rapid movement of the vessel, which fact is proved by the wearing of the copper more rapidly upon the sides of a vessel from the bow to the broadest beam, than upon the sides from the broadest beam to the stern.

Inertia, Momentum, "Hollow Line."

Water, like all other liquid or solid bodies possessing weight, when at rest has a certain tendency to remain at rest, called Inertia; and it requires a greater power to set in motion a certain body of water than is required to keep such body of water in motion, and increase the rapidity of its movement after it commences to move by any force acting upon it, as is familiarly illustrated by the movement of a car on the railroad. A car that two horses can barely set in motion while overcoming its inertia, will when it begins to move and acquire *momentum*, move more and more easily until one horse can continue its movement at a considerably high rate of speed. So with a boat with a sharp wedge-shaped bow running rapidly in slack water. It overcomes this *inertia* at first with a small resistance by a gradual displacement of the water, and the *momentum* the water acquires when once set in motion by the action of the sides of the vessel against it, makes it move more and more

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easily laterally as the boat advances, so that the beam of the vessel can be widened more and more rapidly to keep pace with the more easy and rapid movement of the water from the sides of the vessel, and produces along the sides of the vessel a hollow water line, gradually swelling into an outward curve at the broadest beam of the vessel, which should invariably be at or near the center of the vessel—where the greatest possible speed is required with the least possible power on a boat of any given length and certain proportionate breadth of beam. For if the broadest beam be much forward of the center of the vessel, the water-lines must necessarily diverge from the bow to the broadest beam at a more obtuse angle, and therefore meet with more resistance in displacing the water; and if the broadest beam be carried much aft of the center of the vessel, the water-lines must necessarily converge from the broadest beam to the stern at a more obtuse angle, and would therefore run more rapidly at any given speed away from the propelling or sustaining reaction of the water upon the stern sides of the vessel, and produce a "suction or dragging" of the water after the vessel which so much tends to resist its rapid movement, as is well known to all persons who have observed the action of the water at the stern of vessels of various models.

Upon the principle of inertia and momentum, just explained, it will be seen that a boat drawing 3 feet of water, and 50 feet beam, and with a floating capacity of 1,000 tons, would meet with but one half the resistance from overcoming the violent resistance of the water, by its inertia, as before explained, that a boat would drawing 6 feet of water, and say 40 feet beam, and of 1,000 tuns burthen; for, in running at the same speed as the former boat, she would have to set in motion constantly just double the quantity of water, and would therefore meet with double the resistance from its inertia. Therefore, I state as a principle, that a boat of 1,000 tons floating capacity, or of any other capacity, had better be 50 feet beam, and draw 3 feet of water, than to be 40 feet beam and draw 6 feet of water, and have a floating capacity of 1,000 tuns; for it takes much less power to set 3 feet of water in depth in motion, and when in motion by its constantly increased momentum, as before explained, to press it 50 feet wide to the broadest beam of the vessel, than to set 6 feet in depth of water in motion, and then press it 40 feet wide, for a vessel of equal floating capacity.

Hence, the less the draft of water to the floating capacity of the vessel—although the increased floating capacity has to be gained in part by a certain proportionate increased breadth of beam to the length of the vessel—the faster the vessel can be made to run with a given amount of power. And therefore the peculiar and great advantage of the plan of model and construction as herein set forth in this point of view; for by it we obtain a light structure of the hull, in proportion to the floating capacity of the vessel at a given depth

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of draft, gained in part by the increased breadth of beam, and in part by the proportionately greater length of keel, by which easy water lines and diminished draft of water are obtained, and consequent diminished resistance, in proportion to the size and capacity of the vessel, and hence with a given power a proportionate increase of speed.

The New Model as applied to Ocean Vessels.

The object mainly in view in originating and applying the new model to vessels for rivers and the ocean, has been not so much to build small size vessels upon the new model, or to build vessels of the largest size now built for the rivers, or the ocean, and gain thereby a proportionate advantage over others of a similar moderate size, from this peculiar model, but it has been to build vessels of a far greater size than any now built, and greater than can be built from any other known model, with corresponding advantages as to economy of construction, buoyancy, capacity, strength, durability, safety, or speed, and lightness of structure.

The engraving on page 16 represents the horizontal section of the steamship Columbia, at the water lines, with guards and wheels, and the model and proportionate extension of the bow and stern beyond the main deck of the vessel.

The engraving on page 17 represents the steamship Columbia as she would appear in running in a heavy sea.

Keel, 350 feet; deck, 300 feet; beam, 50 feet; depth of draft when loaded, 16 feet; diameter of wheels, 48 feet.

She is designed to have 4 engines of a new plan of construction and application, having an aggregate power of 2,000 horses. By the advantage of the model, and by the amount and manner of applying the power aboard of her, it is estimated from experiments made from the foregoing data of calculation, that she can be run at the average speed on the ocean of 400 miles in 24 hours.

In fig. 1, page 19, A A A A A A A represents the longitudinal outline of the hull of the steamer Columbia. B B B B B B represents the longitudinal outline of one of the Collins steamers as compared with it in length of deck, and length of keel, and depth of draft. C C C C C C represents the outline of a steamer of the length of keel of the steamer Columbia, with the deck carried out proportionately beyond the keel at the bow and stern, as in the usual plan of modeling. The waved line E E E represents a trough of the sea, with the respective vessels resting in it, and the proportionate rise, action and strain of the water upon them. The waved line F F F represents a swell of the sea, with the respective vessels resting upon the top of the swell supporting them in the center, and falling away at the ends leaving them comparatively unsupported, and thereby producing a

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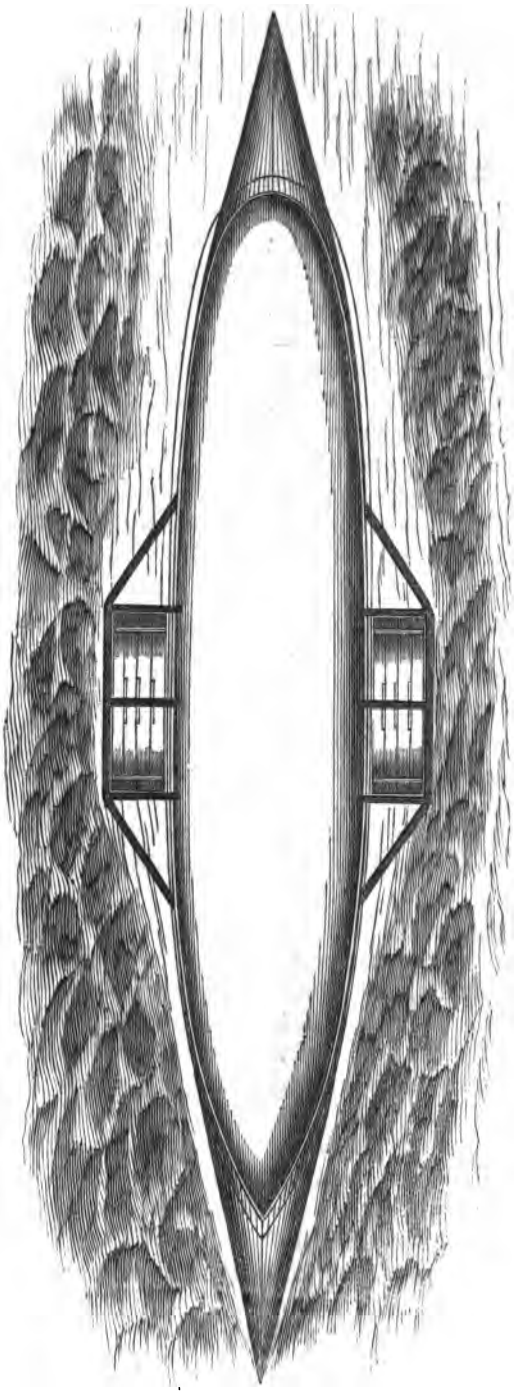

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The Steamship Columbia in a Heavy Sea.

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proportionate strain upon the center of each vessel at the line G G, corresponding to the proportionate amount and weight of material pendant in each vessel at a given or proportionate, greater or less distance from the centre of the vessel, which is the centre of strain. The line D D D represents the level of the water at rest.

Now, suppose the two vessels indicated by the outlines marked A and C, having the same breadth of beam, and the same length of keel, viz. 350 feet, and therefore the same advantages in the water lines, but with the difference of draft produced by the proportionately greater amount and consequent weight of material used not only in the top of the ends of the vessels as indicated by the outline C C C C C C in building out the upper decks, but also in the proportionate greater weight and strength of materials necessarily used to strengthen the center of the vessel, to sustain the great weight at the two ends of the vessel at so long a distance of leverage of action from the middle of the vessel when the upper portion of the vessel is carried to a greater length than the keel, as in the ordinary model, as compared with a vessel of the same length of keel, and advantage of water lines, with the shorter deck, and consequent less cost and proportionately less amount of weight and material at a given distance from the centre of the vessel to strain her when running in a heavy sea, as indicated by the outline marked A. It will also be seen at a glance at the outline marked A, as compared with the outline marked C, that it presents far less superficial feet of side surface above the level of the sea, at the distance of a long leverage from the centre of the vessel which as before stated is the centre of strain, for the wind and heavy swells of the sea to dash against and strain the vessel, careen her over, and impede her progress. The vessel with the short deck and long keel, will also be less top-heavy in proportion to her buoyancy and capacity, as compared with the outline marked C, as she will be more like a pyramid upon its base, from having less materials above the water line in proportion to that below, as compared with the vessel with the long deck, which is comparatively like a pyramid upon its apex. The vessel with the short deck and long keel, from having so large a base will therefore have less tendency to roll and plunge in a heavy sea, as has been proved by numerous experiments with the new model.

The extended ends of the steamer Columbia when running in a heavy sea would be most of the time partially or wholly submerged, and, therefore, would be out of the reach of the percussive force of the sea to dash against and strain the vessel, as would be the case against the upper portion of the extended sides and deck of the vessel, indicated by the outline marked C. When these two vessels were in the trough of the sea one would be supported with greater force, and strain at the two ends by displacing a larger body of water near the upper deck of the two ends of the vessel, and the water fall-

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Fig. 1

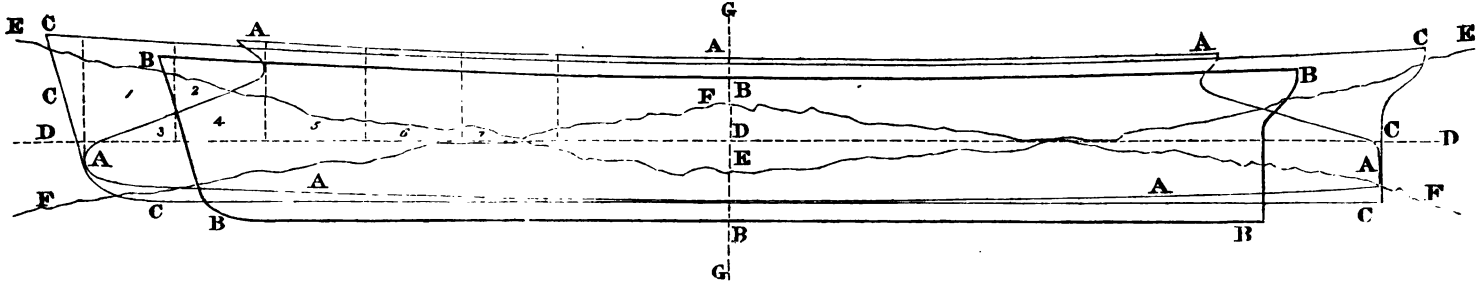
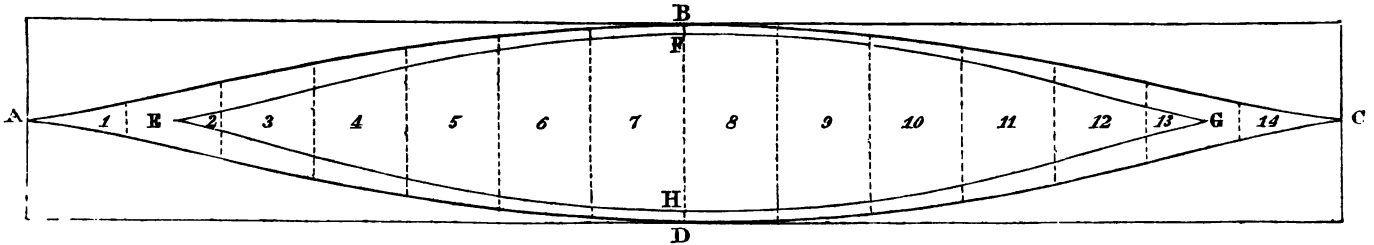


Fig. 2



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ing away proportionately in the middle; while the other would settle more easily into the trough of the sea, by displacing no water at the two ends above the water lines, and the ends being submerged without the chance of the water breaking upon the deck of the vessel. In short, the vessel with the long water lines and short deck as in the steamer Columbia, when running in a heavy sea, has the advantage of a vessel with a long keel, as to easy water lines, and, therefore, increased buoyant capacity and diminished resistance, with the advantage of a short vessel on deck in riding a heavy sea easily, dry, and buoyantly with the least possible strain upon the vessel.

When the two vessels now under consideration were resting upon the top of a sea, the vessel with the short deck having less weight pendent and unsupported by the water at her ends than the long vessel on the deck, would be less strained when running over the top of a large swell upon the ocean. From these data I set it down as an incontrovertable conclusion proved theoretically and sustained by experiments, that a vessel with a long keel and short deck as compared with one of the same length of keel and proportionately longer deck, as on the present plan of modeling, will run on a heavy sea more rapidly, and with less strain and resistance, and will not roll or plunge so much, will be stronger and more buoyant than if the deck were carried out as long or longer than the keel, on the plan usually adopted. And further, the projecting bow by giving the vessel more floor and buoyancy at the bow in proportion to its top weight, when plunging into an approaching sea, displaces a certain number of tons of water, and lifts the main bow, with a force equal to the tons of water displaced, out of the reach of the sea, striking against it to stop the progress, and careen over, and strain the vessel, by which means it will ride a heavy sea lighter and dryer than a vessel of equal capacity of burden built on the old model.

The extended bow and stern of vessels built on the new model, being of a semi-cylindrical, sharp wedge-shape form, both longitudinally and vertically, have the shape and proportion of the greatest strength and least surface for resistance, and greatest buoyancy in proportion to the material used, possible to be obtained. This model is a copy from, and an adaptation of the peculiarities of *swift swimming fish* to the hull and water lines of a vessel; being an attainment of the grand object ship-builders and others have so long aimed to accomplish, in the model and construction of vessels.

In fact it is *nature's model* for speed in the water; and the hull of the vessel when running, resembles the back of a fish rising above the surface of the water, with the deck of the vessel formed, proportioned, combined with, and built upon it.

Some persons on a casual observation of my models and drawings have supposed that the projecting bow of the vessel, when plunging into a heavy sea, would tend by rising over the top of the bow, to depress the bow of the vessel, and impede the progress. This same objection arose in my

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mind in relation to the projecting bow, when I first conceived of this plan of model; but on a more critical calculation of the effects the water would have upon such an extended bow and stern, I found that such impression was not correct (the truth of which has since been sustained by numerous experiments), for with this plan of extended bow, we have all the advantage of floor and buoyancy to lift the main bow of the vessel, when plunging into a heavy sea, without the weight, depressing force, and disadvantages of the top weight of material, used in constructing the upper part of the bow of the vessel, above the water lines on the usual plan of model, which has to be lifted when a vessel rises upon a swell of the sea. And when a vessel of the ordinary plan of model, plunges from a heavy sea, this superincumbent weight of material on the top of the bow, without a corresponding buoyancy below to sustain it (at a long distance of leverage and motion from the centre of the vessel), which is the centre of action and fulcrum of strain, by its momentum acquired in descending, plunges the vessel deeper into the water than if constructed upon my new plan of model, thereby violently straining the vessel and impeding her rapid movement.

The top of the extended bow, being of a narrow, sharp, wedge-shape form vertically, and gradually descending and diminishing from its connection with the main bow to the water edge, when it plunges into a heavy sea, or a heavy sea breaks over or upon it, by its peculiarly sharp, and advantageous shape, cuts through the water upwards, and displaces it in that direction so easily, that it glides off from the bow as the water recedes at the sides; so that it is not possible under any circumstances, to load the bow or stern with any weight of water, which has not an equal and greater pressure upwards on the bottom of the extended bow, to counteract its weight and force of resistance. And therefore the advantages of the extended bow and stern in buoyancy, and diminished resistance, especially in running in a heavy sea.

The proportionate extension of the bow and stern taken together, on the new plan of model, is designed to be from $\frac{1}{4}$ to $\frac{1}{3}$, the length of the whole vessel, and a great advantage is gained in the extended bow and stern, not only in diminished surface for resistance above the water, but in the equilibrium obtained between the buoyancy and the weight to be sustained by the buoyancy longitudinally throughout the whole length of the vessel. For in the extended bow and stern as the buoyancy diminishes by the sharp and gently running water lines from the main body of the vessel at the bow and stern, the weight to be supported diminishes in the same ratio; and the surface for resistance, friction, and strain diminishes also. So that the vessel throughout can be lighter in its structure, and proportionately stronger, than when built with an equal internal and useful floating capacity on the old plan of model and construction.

The new plan of model partly involves the necessity of a new plan of steering and anchoring (although the present plan can be used with the new

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Fig: 1

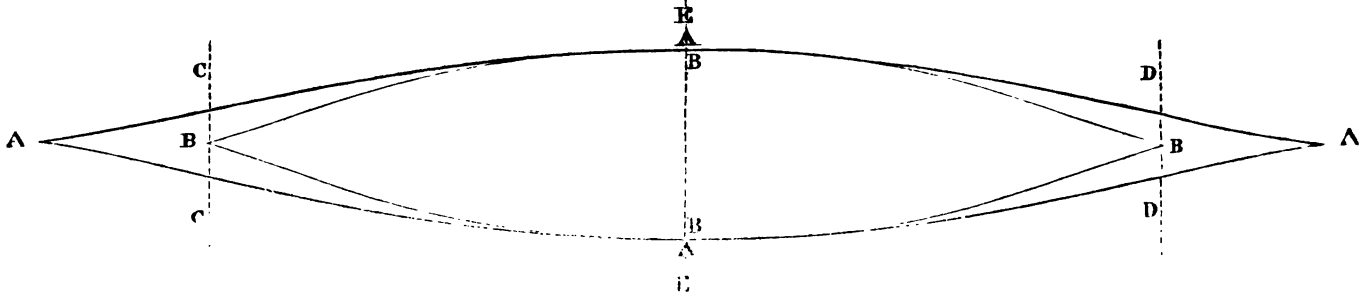
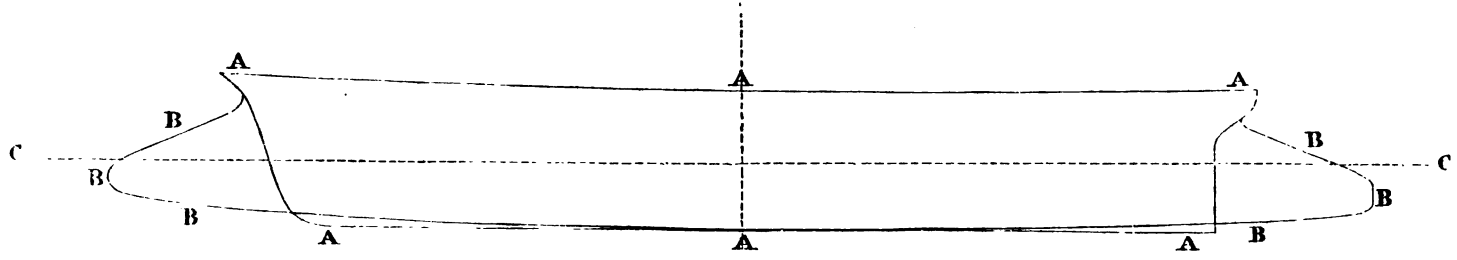


Fig. 2



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of draught in favor of the Columbia, which is a remarkable advantage; then by the means by which this diminished draught of water is obtained with a greater useful capacity in the vessel (by the greater length of keel), we have water lines one-third easier than in the Collins steamers, viz.: six degrees in one instance and nine degrees in the other, so that the diminished body of water in depth to be moved will be displaced one-third easier, and will re-act upon the sides of the vessel from the broadest beam to the stern with one third more advantage than in the Collins steamers, which are taken as a standard of comparison as they are considered the swiftest vessels on the ocean. On the steamship Columbia, in addition to the diminished body of water to be displaced in depth of draught, and diminished resistance in displacing such body of water, by the easier water lines, as before explained, she is designed to have double the power aboard of her. So that, by the diminished resistance in the water, and by the increase of power in the proportion named, it can be easily calculated by any person acquainted with the laws of fluid resistance acting upon a body of a certain form moving rapidly through it—that the speed of the steamship Columbia is not over estimated at 400 miles a day, at which speed she could cross the Atlantic from New York to Liverpool in seven and a half days.

To still further illustrate the advantages of large vessels for the ocean on the new model, as compared with smaller vessels, it may here properly be stated, that the proposed *great American iron steamer Leviathan*, to be 700 feet keel, 500 feet deck, 80 feet beam, 60 feet depth of hold, will expose but 45,500 feet of surface, for the water to act upon by friction, at 20 feet depth of draught, and at that depth of draught will displace 16,500 tons of water, and her water lines will diverge from the bow to the broadest beam, and converge from the broadest beam to the stern at an angle of but six degrees.

The Collins steamer, at 3,000 tons, has a superficial surface exposed to the action of the water by friction of 16,500 feet; while the *Leviathan*, with a floating capacity of 16,500 tons would have a surface for friction of but 45,500 feet. The friction surface of the two vessels of 16,500 feet against 45,500 feet would be less than three to one, while the floating capacity of the two vessels of 16,500 tons against 3,000 tons would be as five and a half to one. A remarkable advantage, as to friction surface and weight of material required to construct the proportionate surface of each vessel, in favor of the Leviathan. This advantage as to floating capacity and diminished friction surface of the large vessel over the smaller one, is gained on the well-known principle that it takes less exterior surface, and consequent less weight of material, proportionately, for a cube, cylinder, or globe, twelve feet in diameter, required for a cube, cylinder, or globe, six feet in diameter, in proportion to their interior capacity.

From the diminished friction surface proportionate to its floating capacity of the Leviathan, and from the easy waterlines obtainable by its great length

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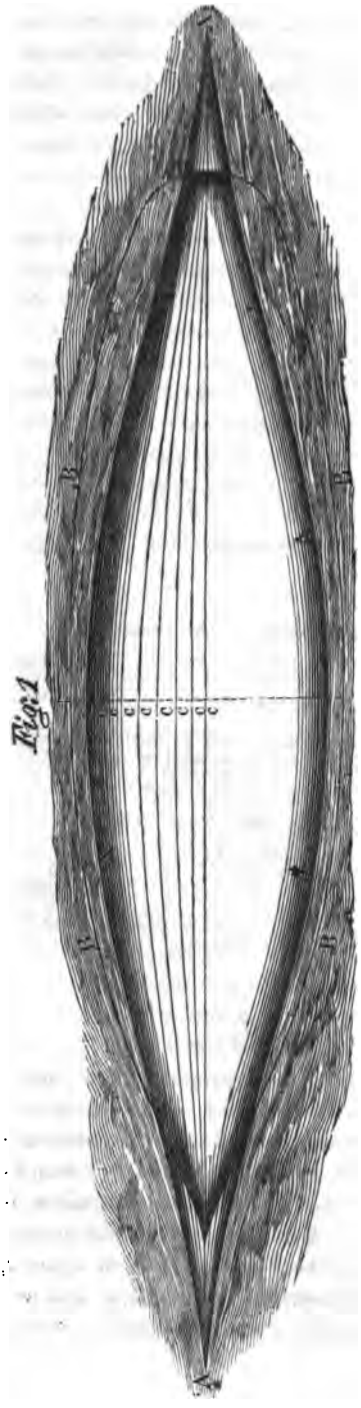

Fig. 1

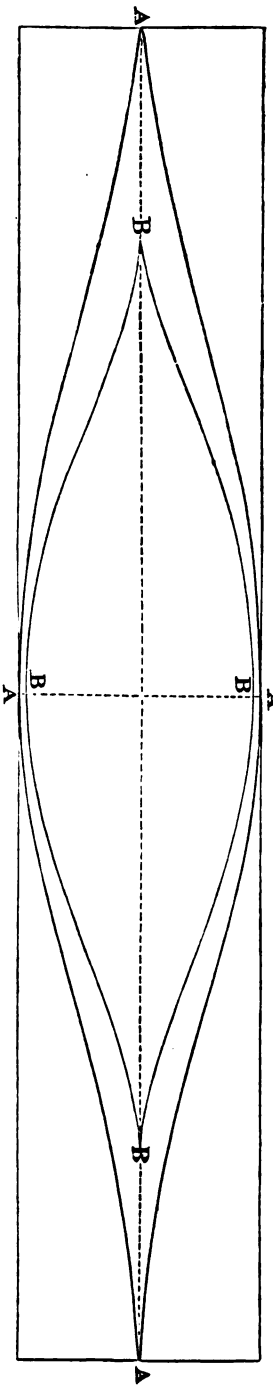

Fig. 2

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stead of constructing your keel and water lines proportionately shorter, as on the ordinary model, extend your keel and water lines to correspond to the outline marked B B B B B B at each end of the vessel in figure 2 ; and by a very slight addition of expense and weight of material and surface of resistance for the water to act upon to strain the vessel or resist its rapid movement otherwise, you will have greatly increased the buoyant capacity of your vessel, and increased its internal capacity for cargo, and rendered the water lines far easier by a more acute angle of divergence and convergence of the water lines, as seen on figure 1, page 24, in which B B B B represents the proportionate breadth of beam and length, and water lines of a vessel on the old model, and the lines A A A A represent the same model improved by the extended bow and stern, by which the internal capacity of the vessel is largely increased at each end, with a proportionate increase in buoyancy and easier water lines, by which the resistance to such vessel in running rapidly in the water would be much diminished, and thereby its speed with a given amount of power proportionately increased, as has been proved by numerous experiments.

The Schooner-rigged Yacht Tornado.

Figure 1 page 26, represents the horizontal section of the Yacht Tornado ; A A A A A A horizontal section of the hull at the water line, and represents the model and proportionate extension of the bow and stern of the hull beyond the main deck ; B B B B outline of the deck; keel 125 feet, deck 100 feet, beam 26 feet.

In figure 2, page 26, A A A A represents the horizontal section of the hull of the yacht Tornado at the water line; and B B B B represents the horizontal section at the water line of a vessel, the same length on deck but with a proportionately shorter keel as in the ordinary model in comparison with it, which partly represents the relative ease of the water lines and proportionate capacity and buoyancy of the two vessels. The section B B B B represents nearly the water lines and proportionate dimensions of the Yacht America, as compared with the Tornado.

The Pleasure Barge Sword-Fish.

The engraving on page 28, represents the pleasure barge "*Sword Fish*" as she appears running on smooth water, when propelled at the rate of 12 miles an hour by the power of 8 men. She was the first boat built from the new model, and fully realized the calculations made as to her speed. She is comparatively a heavy boat, as she was intended for a small engine, and yet from the advantages of her model she has so light a draft of water and such easy gently-running water lines, that she has been easily run at the speed above stated, and rides a heavy sea more *buoyantly*, steadily, easily, rapidly, and dryer than any boat of a similar size built on any other model. She

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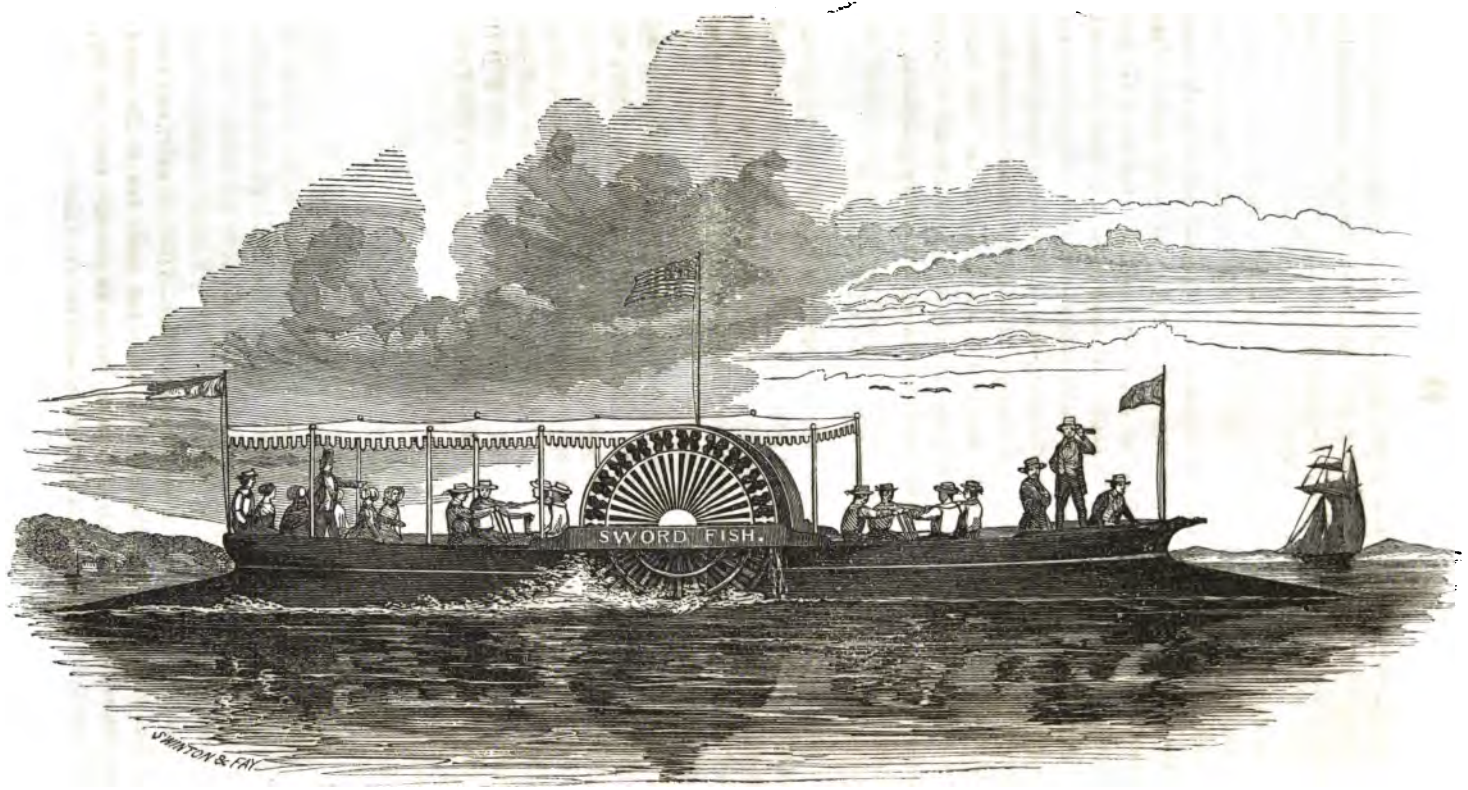

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was launched October 1851, and has been thoroughly tested and fully proved the many advantages of the new model. Keel 36 feet, deck 25 feet, beam 5 feet, depth 2 feet, diameter of wheels 5 feet 6 inches.

The Yacht "Sea Bird."

The engraving on page 30 represents the sloop-rigged Pleasure Yacht "Sea Bird," as she appears sailing. She is the first vessel built by Mr Davison, on his new model, to be propelled by sails. She has just been completed, and fully tested in smooth and rough water, and sustains all the calculations made in relation to her as to speed, strength, steadiness, buoyant capacity, ability to carry canvas in a rough sea and heavy wind, and rides a rough sea under a heavy press of canvas, easier, more buoyantly, rapidly, and dryer than any boat of a similar size built on any other model. The peculiar form of the hull gives her more the shape and peculiarities of swift swimming fish, so that she displaces the water with the least possible resistance, and in fact almost flies over the water with the grace, ease, and rapidity of a bird.

No vessel of a similar size built for rapid sailing after any of the old models, can keep anywhere near her in a heavy wind and in rough water. It has been almost universally conceded by ship-builders, sea captains, and the public generally, who have examined the new model, and expressed their opinions upon it, that the advantages claimed for the new model as to strength, durability, speed, safety, lightness of structure, and great buoyant capacity, would be realized in vessels built on the new model, for rivers, and in smooth water. But by some it was supposed that the new model would not work well on sail vessels, and in rough water. The trials made in rough water with the Yacht "Sea Bird," have fully demonstrated the many advantages of the new model in rough as well as smooth water, and entirely removed all doubts as to the complete success and many practical advantages of the new model in its application to all kinds of vessels, large or small, in rough or smooth water, for the ocean or rivers, and whether propelled by sails or steam.

The successful experiments made with the "Sea Bird," under all circumstances, are generally acknowledged as a great triumph in favor of the new model, and fully establish it in popular favor.

Dimensions of the "Sea Bird."

Keel, 40 feet—Deck, 32 feet—Beam, 10 feet—Hold, 3 feet. Draws but 18 inches of water when loaded. Has an 8 feet centre-board—Bow-sprit, 16½ feet out board—Mast, 45 feet—Main Boom, 40 feet—Jib-boom, 27 feet. She carries, when under full sail, 1,050 superficial feet of canvas.

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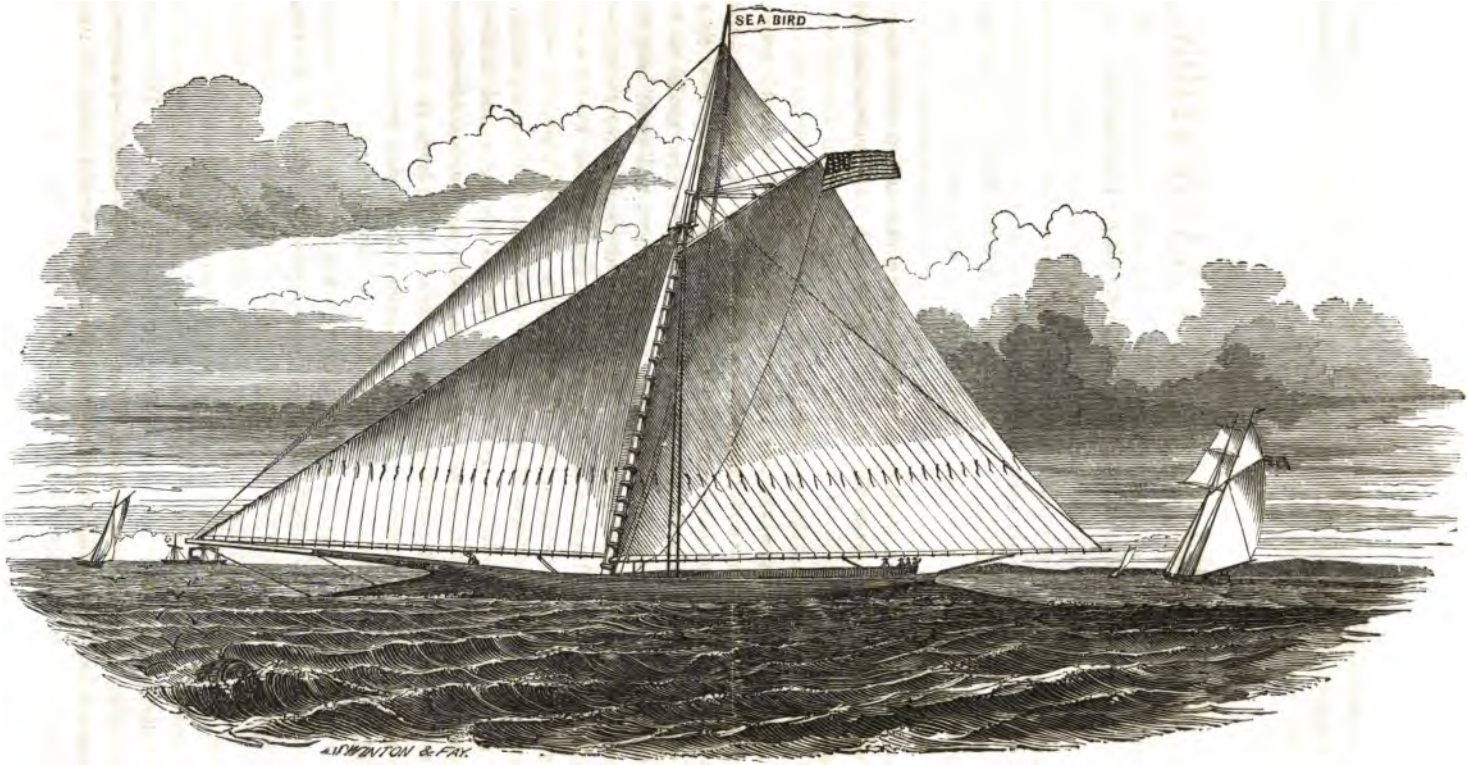

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NEW ERA IN OCEAN NAVIGATION.

MONSTER AMERICAN IRON STEAMER!

CIRCULAR.

To the Editors, and People of the United States:

Messrs. Editors,

GENTLEMEN,

As the friends of progress and improvement, permit me to introduce to the notice of the people of the United States, through your journals, my project for building a *Monster Iron Steamer*, as a great National Enterprise, to run on the ocean at a speed of thirty miles an hour.

The grand object, during the past ten years, of my labors and improvements made in the model, construction, and propulsion of vessels for ocean and inland navigation, and the efforts I have lately made to give publicity to my labors in this department of improvement, have been to familiarize the public mind with my plans and ideas as applied on a moderate scale, and thereby prepare the way for proposing and building the great ocean steamer, the main features and advantages of which it is the object of this circular to place in a general way before the editors, government, capitalists, and people of the United States, for their careful, candid, and immediate consideration.

The time has arrived for pressing this subject upon the attention of the American people, if they would secure the national and individual advantages both in honor and profit, which will at once arise from building the proposed steamer, as from recent accounts from England, it is said that a similar project is on foot there, which has been started no doubt from the suggestions heretofore made privately in relation to the subject. It was my intention to build and run the great 500 feet Hudson River steamer, "General Washington," to demonstrate the feasibility of my improvements and plans, as applied to river vessels, before proposing to build the great ocean steamer; but the recent movements in England have now caused me to place the subject before the public sooner than I otherwise should have done, and it may be, perhaps, prematurely.

The dimensions of the steamer I propose to build would be, keel, 700 feet; deck, 500 feet; depth of hold, 60 feet; beam, 80 feet; draft of water

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from 18 to 20 feet; and when loaded, she would displace 16,500 tons of water. And her engines would have an aggregate power of 5,000 horses. The hull, and all her decks, to be built entirely of iron, on a new principle of construction, combination, bracing and proportions, giving prodigious strength with lightness of structure, and great buoyant capacity. No wood will be used in the construction of the vessel, except the joiner's work for the cabins, and with provisions to be made in reference to instantly extinguishing any fire that might occur there, would render the vessel indestructible by that element. The hull is intended to be divided into a large number of water-tight compartments, so that if any accident should occur to any part of the vessel, she could not possibly sink. And from the proportion and manner of construction and propulsion, she will be so strong, and so well adapted to withstand the violence of a heavy sea, that it will be absolutely impossible to destroy her by the force of the waves, or even by being cast away. She is designed to be propelled by sixteen separate and distinct engines and propelling apparatus, of about 300 horse power each, of a new plan of construction and application, placed in sixteen separate water-tight compartments, so that if one or more of the engines should be disabled on a voyage, from any cause, she would have sufficient power and machinery left in efficient action to complete her voyage without the aid of the wind. And therefore she would carry no masts, rigging, or sails, and would thereby avoid the great resistance they offer to the wind, make the vessel less top-heavy, and reduce its proportionate first cost.

There would be no side-wheels or other propelling machinery above the water-lines for the heavy swells of the sea to dash through and against, to strain the vessel, careen her over, stop her progress, and waste the power. This is a point on which the plan of propelling the large steamer proposed to be built in England, if built, will be a comparatively failure; as it is proposed to have two sets of side-wheels of the ordinary plan of construction above the water, and a stern propeller, all to be worked with a power of 3,000 horses. A large vessel of the proposed dimensions running on a rough sea would reach over several swells, and the swells would rush by the sides of the vessel with great force, almost entirely submerging the side-wheels, stopping their movement, and wastefully applying the power. And when the wheels were over the trough of the sea, as the vessel would not rise and fall as smaller vessels do, the wheels would be nearly or entirely out of water. The propeller, when the stern of the vessel was passing over the trough of the sea would be out of the water also, so that the whole machinery would have a straining and jerking movement, and an inefficient and wasteful application of the motive power.

The vessel I propose to build with sixteen engines, of about 300 horse power each, would have all the machinery and propelling apparatus distri-

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buted at various points in the vessel, below the swells of the sea, and would therefore have a direct, constant, and efficient action in rough water as well as smooth, producing no strain upon the vessel, and driving her over the swells with great force and rapidity.

The manner of generating and applying the propelling power in such a large steamer, is an important and inseparable feature connected with it, and upon this in good part depends the success of the enterprise. ☞ SIDE-WHEELS, OR STERN PROPELLERS, WILL NOT WORK WELL ON SO LARGE A STEAMER IN ROUGH WATER.

I have a new plan of generating the propelling power, with a light and simple apparatus, combining *heat*, *steam*, and the *pressure of the atmosphere* by which the power of 5,000 horses can be produced at a small expense thereby avoiding the great weight and expense for fuel now incurred for that amount of power, and avoiding all danger from explosion and fire, now so much dreaded. A vessel, such as herein proposed to be built, could carry fuel enough in a small space, for a voyage around the world (a consideration of vast and wide-reaching importance when fully realized). The engines and propelling apparatus will be constructed on an entirely new plan, very light and simple, and not at all liable to get out of order.

As I have not taken out patents in this country and Europe for the engines, propelling apparatus, plan of generating the propelling power, and manner of constructing the hull of the vessel, and plan of steering, which will be embraced under five distinct patents, it will be seen that it is proper that I should not give any more detailed idea of them at present.

I have been seriously debating in my mind for some time past, and I am not fully determined now, whether in view of the magnitude and national importance of my improvements, inventions, and discoveries, it would not be as well for me to throw them open to the free use of the public as to attempt to control them by patents and individual monopolies, and rely upon the liberality and sense of justice of the people and various governments for my reward, more particularly as I am more desirous of securing the credit of making these improvements, beyond a question or peradventure, than to make money therefrom.

A steamer of the proposed dimensions could splendidly accommodate 3,000 passengers! and an immense amount of freight. It is designed to fit her up with a magnificent saloon in the centre of the vessel, 18 feet high, 50 feet wide, and 200 feet long! with a splendid dome-light from the upper deck, and to be finished and furnished in the highest style of modern art, with every possible luxury and convenience. There would be two stories of state rooms upon each side of this magnificent saloon, with light and airy galleries &c., &c. The whole ship throughout is designed to be supplied with every modern improvement and convenience, the same as now enjoyed in the best

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private dwellings and hotels. Every state room to be furnished with permanent marble basins, supplied with hot and cold water from pipes running throughout the ship, and also to have extensive accommodations for bathing. The whole ship throughout to be lighted with gas, and heated by steam in the winter, and to be completely ventilated in every state room and apartment by an engine used expressly for circulating fresh air throughout the ship, and driving out the vitiated air. With an ocean of pure water below, and an ocean of pure air above, there is no reason (ample provision being made for supplying it) why persons on ship-board should not *bathe and be clean, breathe purer air, be healthier, and enjoy more* (at least for a time), upon such a magnificent vessel, than in any other place upon the face of the earth.

A vessel of the dimensions above proposed would not roll and plunge like smaller vessels, but would subdue the roughness of the sea, and keep steadily on her course, and thereby *avoid sea-sickness* with its unpleasant associations, which now render smaller vessels so disagreeable in rough weather.

A vessel like the one described could be used to carry emigrants and freight at a mere nominal price, considering the number that could be carried, and the speed and certainty as to time in which the ocean could be crossed, and be one of the most profitable commercial operations that could be entered into at the present day, to say nothing of its grandeur and importance as a great national enterprise.

Look at the subject one moment in a national point of view, even if entered upon and built by private capital. Suppose a vessel to be built of the giant proportions named, and the speed stated could be made with her (which can be clearly shown), and the vessel to be finished in the manner proposed, with all the magnificence and skill of which American genius and handicraft are now capable, together with all the novelty of size, model, construction, engines, propelling apparatus, steering, &c., to interest and astonish the mind of the beholder. And then, to use the language of a friend, in conversing upon this subject, "If this Ocean Chariot, the Floating Palace of the New World, were to be run to Liverpool, London, Paris, and the other principal ports of Europe, and exhibited at a small sum per head, would be immensely profitable in that way as a mere money-making enterprise, as she could be made to pay for herself twice over in a brief period in that way alone.

"But," said he, "viewed as a great national triumph, how its grand proportions would fill the minds of the people of the European nations with astonishment, and stimulate them to the enjoyment of the liberty which produced such magnificent results, of which this vessel would stand before them as a tangible evidence; being a greater wonder to them of the progress, power, and skill of the American nation under the influence of liberal institutions, than the Pyra-

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mids of Egypt, or the Hanging Gardens of Babylon (of the seven wonders of the world), were to the people of the nations who built them. And further, said he, as a national and commercial enterprise, this stands forth as one of the grandest projects of the age, in fact, of the nineteenth century. For by it England will be brought within 5 days of New York; California, 10 days; Australia, 14 days; China, Japan, and the great commercial resources of the East, 16 days; and by the Pacific Railroad, when built, China would be brought within 12 days of New York; and by this means the vast treasures of the East would be poured along the Pacific and Atlantic into the lap of the New World. Giving to the United States—like heretofore unto Tyre and Sidon, Holland, Portugal, Spain, and latterlyEngland—by the possession of the trade of the East, the controlling power of the nations, and of the commerce of the earth.

In view of these results it now only remains for the government, capitalists, or people of the United States, to examine into the feasibility and certainty of success of this enterprise, and being convinced, lend it their willing, earnest, and immediate support.

A little over the cost of two of the present Collins' Steamers running on the Atlantic, would build one of these magnificent floating palaces as proposed, and if successful, of which it can be shown there is not a doubt, a revolution will at once be made in commercial and national affairs, in favor of the people and government of the United States, such as the world never before witnessed. It is, perhaps, proper for me here to state, that I have never solicited or received one dollar from any person in connection with my improvements. And I wish it now *distinctly understood*, that I do not now ask for, nor do I want any money paid to me on any condition whatever, until a vessel is built and put into successful operation, and accomplishes what is herein set forth. I will also take this opportunity to respectfully suggest to the *government of the United States, to capitalists, to financiers*, and others who may have an interest, or who may see their interest laying in this direction, to examine into the subject at once, as they may discover a mine of wealth and power in it both in this country and in Europe, such as can rarely be met with. And from the magnitude of this business, it will be readily seen that one person can do but little in carrying it properly and expeditiously forward, and as my time and attention is almost wholly taken up with the details of my improvements and experiments, I have not the time to bring the subject properly forward, and press it upon the attention of those directly interested therein, and organize and look after companies, and make the necessary financial arrangements for building vessels upon my plans. My inclinations and abilities also lead me in another direction, and therefore, I shall allow this duty to fall upon other competent parties, who may come forward to undertake it, and they can receive a large part of the profit to arise therefrom, by patents and otherwise, both in this country and in Europe.

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The model, and a lithographic drawing of the great iron ocean steamer "Leviathan," as she would appear running in a heavy sea, together with a horizontal section of the hull at the water-line, and an interior view of her grand saloon, can be seen at my office.

DARIUS DAVISON,
374 & 376 BROADWAY, N. Y.

Sept. 10th, 1852.

THE SCHOONER RIGGED YACHT TORNADO.

A CHALLENGE FOR A YACHT RACE.

The following proposition to build a Yacht, was published in the editorial columns of the New York Courier and Enquirer, May 29th, 1852, and copied into several of the other principal city papers, and published and commented upon in other papers in this country and in Europe. There has no one yet come forward, either in this country or in Europe, to accept the offer; and therefore my friends and the public consider the non-acceptance of the offer an acknowledgement on the part of shipbuilders, and those interested in the speed of sail vessels and Yachts, that there is an advantage as to speed, in the extended bow and stern on the plan of my new model, with which they dare not compete with any other model heretofore known or in use—in accordance with the following proposition.

TO THE EDITORS OF THE COURIER AND ENQUIRER:

I have been frequently asked, within the last week, if I was well enough assured of the speed and sailing qualities of vessels built on my model, to build a vessel to race with one to be built on any other known model from which any vessel has heretofore been constructed?

In answer to these inquiries, and to gratify the interest excited in the public mind in this country and in Europe, in relation to my new model for ocean and river vessels, I will make the following offer, which will be held ready for acceptance for one month from the first day of June:

I will build and complete, within the period of six months from the first day of June, a schooner-rigged Yacht on my new model, which shall be *one hundred feet on deck*, and, when completed, will cost about THIRTY THOUSAND DOLLARS; and I will sail her in a race with any vessel that can be built within that period, from any other known model from which any vessel has heretofore been built; such vessel to be built the same length on deck, viz.: *one hundred feet.* And this is the only point upon which they shall be controlled in dimensions, construction, rigging or sails (except that the vessel shall

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be built of wood.) And I will sail my Yacht in a race with any vessel so built that may be matched against her, after the period of six months from the first day of June, 1852, at any time and place, and under any circumstances that may be chosen by the other parties, whether such contest be upon the river or ocean, with or against the wind, in a heavy or light breeze. If my Yatch is beaten, I will deliver her, with all her appurtenances, to the winner of the race as a prize, and if the opposing vessel is beaten, she shall be delivered to me, with all her appurtenances, as a prize.

I will give them the further advantage of seeing at my office a Lithographic drawing of the model, rig, and sails of the Yacht I propose to build, as she would appear upon the water.

Respectfully,

DARIUS DAVISON, 374 Broadway, New York.

May 28th, 1852.

NEW ENGINE AND NEW MOTIVE POWER.

To the Editor of the Herald of the Union.

About ten years since, during my researches and studies in relation to steam and other artificial motive power, in connection with other improvements and inventions I was then engaged in originating, I discovered a principle by which I conceived that a motive power might be produced at an expense so trifling as not to be worth estimating as compared with the expensive and hazardous means then, and at present, in use for producing a motive power by steam.

By long continued observation, reflection, and experiments, I proved this discovery, and became fully convinced that the principle on which it was founded was correct. I then immediately commenced to invent the means of successfully applying this new motive power to the useful purposes of life. During the period of the last ten years, I have been assiduously engaged in experimenting upon this new principle, and inventing and trying the means of successfully applying it where steam or any other artificial power now is, or can be used. I have fully succeeded in realizing my highest expectations, and will here state to the public that an artificial motive power, to any extent required, can be produced by well known laws of nature at a mere nominal expense, without any danger of explosions, &c., now so severely felt by the community, in the use of steam as now generated and used. With what success I have devoted my time and abilities to the originating and perfecting this new engine and motive power in connection with my other improve-

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ments, will be made apparent to the public in a short time, which will be as soon as my rights can be properly secured in this invention, by patent and otherwise, in this country and in Europe.

The engines and machinery requisite to apply this new motive power on vessels for the ocean, to locomotives, and to stationary machinery, will be much lighter, more simple and less expensive than the present steam engines. There will be no danger from explosions, and they can be readily managed by any person with perfect safety. So, from costing comparatively nothing for a safe and ready power, it can be applied not only to ocean and river vessels, locomotives, factories, and stationary machinery, generally, but every farmer can have a small engine adapted to ploughing and harvesting, and the general work upon a farm to which an artificial motive power can be applied. It can also be advantageously used to raise water to irrigate dry land, and supply cities and towns, and can be successfully applied to propelling carriages, on common roads, in cities and in the country. In short it is applicable to every purpose where an artificial motive power can be used.

Vessels for the ocean built upon my new model, by which the resistance of the water to the rapid movement of the vessel is diminished one-third for any given amount of tonnage; and such vessels being propelled by this new motive power and new engine—by which as great a power can be applied as the vessel will bear, without a corresponding increase in expense for fuel, and increased weight and cost of machinery, as with the present steam engine—can be run across the Atlantic in less than a week, at so small an expense for the motive power as not to be worth calculating, and the tonnage now taken up in steamships with fuel will be saved for freight and passengers.

Vessels for the ocean propelled by this new engine can be run to any part of the world without the inconvenience and expense of stopping for fuel, as in the present steamships, as fuel enough can be carried in a small space for a voyage round the world.

It is proper in this connection to state to the public, that the motive power of this new and simple engine will be produced in a different way from any plan heretofore known, *and will be obtained in part through the agency of heat and steam combined with the all-pervading pressure of the atmosphere, acting upon a vacuum produced and reproduced by simple, efficient, well tried, and comparatively inexpensive means.*

Respectfully, DARIUS DAVISON,

July 1*st*, 1852. 374 Broadway, N. Y.

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ADVERTISEMENT.

DARIUS DAVISON AND BROTHER will furnish estimates for modeling and building Ocean Steamers complete, ready for use, of any size required. We have demonstrated that vessels built upon the new model can be run at least one-third faster (all other things being equal) than vessels displacing the same number of cubic feet of water built on any other known model; and to be unequaled in point of beauty, strength, durability, capacity, and safety, and in economy of construction and propulsion. Ocean Steamers of a cost, proportionate strength, and capacity, equal to the AMERICAN TRANSATLANTIC STEAMERS, can be built on the new model to run at the average speed of four hundred miles a day, or from New York to Liverpool in seven and a half days; and Steamships of a lighter proportionate structure to the tunnage, such as employed in the California and coasting trade, can be built on the new model to run at an average speed of twenty miles an hour.

We will also furnish models and estimates for building Clipper Ships on the new model, of any required tunnage, which (all other things being equal) will sail at least one-third faster than any vessel now afloat of a like displacement of cubic feet of water; and we will also furnish models and estimates for sail vessels of any other kind and size that may be required, that shall have corresponding advantages to those above stated.

We will also furnish models, designs, and estimates for building Steam boats to run on any of the Lakes or Rivers in the United States, except on the Hudson River, that can be run at an average speed of twenty-five miles an hour; the Hudson River being reserved upon which to run the great American Steamer GENERAL WASHINGTON, to be five hundred feet long, and to be finished in the magnificent style of a floating palace, with splendid accommodations for near three thousand passengers, and to be run on the *New National Line* between *New York* and *Albany*, at a speed of thirty miles an hour, in opposition to the *Hudson River Railroad*, and make two trips a day between the two cities.

We have had executed, by some of the best artists in the city, splendid large lithographic drawings of—

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OCEAN STEAMERS AND CLIPPER SHIPS,

Beautifully designed *Steamboats* for the Western Lakes, and drawings of *Steamboats* for the Mississippi River and its tributaries, and a large, beautifully colored lithographic drawing of the Hudson River steam palace

GENERAL WASHINGTON.

Also, a beautiful medium-size lithographic drawing of Darius Davison's sloop-rigged pleasure

YACHT, SEA-BIRD,

And also a spirited lithographic print, in colors, of the American schooner-rigged, model

CLIPPER YACHT, TORNADO.

From her light and sharp model, easy and gently running water lines, and great buoyancy, together with the large amount of canvas she will carry in a heavy or light wind, and by experiments made, it has been demonstrated that she will sail faster than any vessel now afloat in Europe or America.

The above described splendid Lithographic Drawings have been made from designs drawn by Darius Davison, for vessels building and to be built on the new model. And we will furnish to Naval Architects, Engineers, and Ship-Builders, and to those interested in Ships, Steamboats, and Ship-Building, as well as to the public generally, copies of each of these beautiful Lithographic Prints at moderate prices; and we will have copies from each drawing struck off on thin India paper, so as to be readily sent by Post-Office, or on thick paper by express, to any part of the United States, or of the world.

SIZES AND PRICES OF LITHOGRAPHIC PRINTS.

	SIZE.	PLAIN.	COLORED	EX. COL'D.	INDIA PAP.
Steamship Columbia,	30 x 44	$1	$1 50	$2 00	75c.
Steamer America, for the Western Lakes,	30 x 44	1	1 50	2 00	75c.
General Washington,	26 x 44	1	1 50	2 00	75c.
Leviathan,	25 x 35	1	1 50	2 00	75c.
Yacht Tornado,	19 x 24	75c.	1 00	1 50	50c.
Yatch Sea-Bird,	18 x 22	50c.	75c.	1 50	37½c.

We have also had some beautiful finished models, made, moulded, and cast in plaster, which we will furnish to persons wishing casts of the new model vessels, at moderate prices.

They will make handsome ornaments for Hotels, Stores, Counting Rooms' Saloons, Shipping Offices, &c., and the prices at which we can sell them made, and cast in plaster, and beautifully painted, will be about one-fourth the prices similarly finished models would cost made of wood. And these are more durable, as they will not shrink, crack, or warp.

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SIZES AND PRICES OF MODELS.

	SIZE.	PLAIN.	PAINTED.	EXTRA PAINTED. *gilded & lettered.*
Steamship Columbia with paddle box,	6 ft. 6 x 1 ft. 4	$7 50	$15 00	$20 00
Clipper Ship,	6 ft. x 1 ft. 3	5 00	10 00	15 00
Yatch Tornado,	5 ft. 8 x 1 ft.	5 00	10 00	15 00
Yatch Sea-Bird,	4 ft. x 10 in.	2 50	5 00	7 50

We can show that millions can be made out of these improvements, in this country and in Europe; and persons desiring to interest themselves therein in any way, will please apply for further information and an examination of models, drawings, lithographs, boats, &c., at our office in the city of New York.

DARIUS DAVISON & BROTHER,
Naval Architects &c.
374 and 376 Broadway, New York.

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EDITORIAL NOTICES.

The following extracts are taken from extensive editorial notices of our labor and improvements, by some of the most influential New York city papers, during the last year.

From the New York Courier and Enquirer.

NEW MODEL FOR VESSELS.—We have inspected a model for vessels, the invention of MR. DARIUS DAVISON, of this city, of a completely new character from any other hitherto proposed. The main feature in the new form is the extension of so much of the bow and stern of a vessel as is liable to be submerged, but without any corresponding extension in the upper frame. The addition at either end is the proportion of one-third to the length of the main body of the craft, and has the appearance of a broad, sharp-pointed canoe, arched over fore and aft. A vessel thus constructed, when in the water, and with this extended bow and stern buried in the waves, would look as though mounted on the back of a fish. The change of form is accompanied by a change in the main body of the vessel, not necessary here to be detailed. The advantages thus proposed to be gained are several; the lightening the draught of a vessel by displacing its weight of water at the lowest possible point, the lessening the resistance of the water at the bow through which it cleaves; together with lateral friction by means of more gently running lines consequent on great length, the new improvement being considered tantamount to an equal extension of the main body of the vessel; and the obtaining of fuller support to the stern, now left unsupported when a vessel is mounting a wave, which occasions a proportionate depression at the bow, and increased resistance and delay. Mr. D. has made what he considers an improvement in the generating of steam, and in the propelling apparatus, and which he proposes to unite. The latter will be made known to the public in due time. * * * * *

The objects aimed at by MR. DAVISON in the prosecution of his improvement, have been to attain greater speed than has heretofore been reached, by

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the simple and efficient application of well-established principles in the construction and propulsion of vessels for ocean or inland navigation; and he holds that there are but three practical ways of increasing the speed of vessels over that now realized, all of which he has embraced in his improvements, viz. :—

First :—By modeling and constructing the hull so as to draw less water than as now built, for any given amount of tunnage.

Second :—By constructing the hull in such a manner as to diminish the force with which the diminished volume of water to be displaced, acts and re-acts upon the sides and bottom of the vessel, by friction and otherwise in opposition to the propelling power.

Third :—By increasing the propelling power, by some means which will appropriately effect that object.

To give the public a general and enlarged view of the advantages to be gained by his improvement, Mr. Davison states that if two-thirds of the vessels now built and running on the ocean and river, had been constructed and propelled on his plan, they would do all the business now done, thereby saving one-third the capital now invested in steam navigation; or if greater speed were not desired, if all the vessels now running had been built and propelled on his plan, they would be run with much less than one-half fuel now consumed, which would be an advantage given to the commercial interests of the world of many millions annually.

Mr. Davison's drawings, models, and illustrative diagrams of vessels for the ocean, for the Mississippi river and its tributaries, for the Western Lakes, and for the Hudson river, we think cannot fail to please in their architectural design and model all who have the privilege of examining them.

From the New York Tribune.

Mr. Davison's New Steamer.—Our readers will doubtless recollect the announcement put forth some months since by Mr. Darius Davison, of this city, to the effect that he invented a New Steamer, and machinery, by which all previous achievements in steam navigation were to be outdone, and the most rapid ships afloat utterly distanced. This was said with a degree of positiveness which argued perfect certainty on the part of the inventor, and made the reader desirous of knowing something more definite of his invention.

A day or two since, in compliance with Mr. Davison's invitation, we visited his house for the purpose of inspecting the model of his New Ship, and judging for ourselves, if possible, as to its qualities. The improvements he has made in the propelling machinery and the structure of paddle-wheels, he is not yet ready to submit to examination, the patents not being completed.

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The model designed by Mr. Davison is apparently suited to every mode of propulsion, whether by sails, steam, or otherwise. It aims at greater swiftness, by means of a greatly diminished draught of water, with even greater steadiness in a heavy sea, and by a sharpness of model and fitness of curves hitherto not realized. As far as we could judge from a careful examination of the model, there is good reason to expect that the experimental steamer about to be constructed upon this plan will exhibit sailing qualities of a very superior kind. Indeed, we cannot see why the idea of the inventor,—to run from New York to Albany in five hours, and make two trips daily between the two cities,—should not be realized.

In the navigation of the sea we should say that Mr. Davison's ship would be more likely to gain a decided success than that of the rivers. The peculiarities of the model are great length and sharpness with perfect strength; a shape adapted to meet the least possible resistance from the water in the way of friction or otherwise, and light draught of water. Mr. Davison estimates that his ship will meet with less resistance from the water, by one-half, than ordinary vessels.

The bottom in the new model is considerably flatter than in ordinary vessels, at the same time that the curves appear to be more graceful and easy. From the bow and stern project extensions of the hull, rising partially above the surface of the water, and rendering possible the utmost sharpness of model and the greatest ease of movement. By this means the ship is steadied and supported without the need of a great draught of water. The hull being thus, in relation to its length, comparatively little exposed to the action of the waves which rise above the level of the surface and cause such a strain to the ship, would move with greater facility and steadiness in a heavy sea, and consequently would be less impeded in its progress. Mr. Davison calculates that the average speed of a good steamer built on this plan would be 400 miles a day in all weathers, and that its usual time between New York and Liverpool would be seven days and a half. * * *

From the New York Express, May 29, 1852.

Davison's Steamboats, Yachts, Clippers, &c.—We have received from Darius Davison, Esq., 374 Broadway, prints of several projected steamers, on the plan invented and designed by him, on a new and unique plan. One of these is the General Washington, which he intends to be the largest boat in the world, and to beat the time of the Hudson River Railroad between this city and Albany, and to have ample and splendid accommodations for three thousand passengers; another represents the design and model of the steamer America, to run from Buffalo, on a similar grand scale. Also, an American Steamship to be called the Columbia, designed to run between this country

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and Europe, of a similar model, and other prints respresenting ships, yachts, and row-boats of the same model. * * * * .

From the American Artizan, May 29, 1852.

AMERICAN MARINE ARCHITECTURE.—We this week have the pleasure of presenting to the readers of the Artizan a beautiful engraving of Darius Davison's Improved Ocean Steamship. Mr. D. has devoted ten years to the improvements in the design and model of sailing and steam vessels, both for ocean and inland water service. The most apparent improvements consists in having those parts of stem and stern which are in the water to taper off so gradually, and with such an adapted sword-fish form, as to present the least possible resistance. Other objects are to secure the greatest buoyancy with the least possible material, and the greatest length of keel with an easy and gentle water line, and obtain the greatest speed. Strength and durability are also obtained. Messrs. Davison & Brother have, at their office, 374 and 376 Broadway, two model vessels of 50 and 36 feet in length. The latter has been driven twelve miles an hour by eight men, turning the paddle wheels by cranks. They also have elegant lithographic drawings of steamships, steamboats, clipper ships, and yachts.

So vastly important is our steam navigation becoming, that the least improvement in the construction of steam vessels is of national concern. It is quite possible that the fate of the governments of the world will be very greatly influenced by superior steamers.

Messrs. D. solicit no pecuniary aid, but are ready to receive proposals for the immediate construction of vessels, of any size, and for any waters. They are, from long study, deep investigation, and numerous experiments, very sanguine of being enabled to construct ocean steamers that will cross the Atlantic in about SEVEN DAYS. * * * *

At another time we will enter more fully into the principles of these improvements.

From the Scientific American, June 12, 1852.

* * * MR. DAVISON'S propositions have created no small excitement in our city, and throughout the country. He proposes to build a steamboat to run to and from Albany in one day; also a steamship to beat all others now in existence.

From the New York Sun, June 12, 1852.

* * * To illustrate the many advantages of the new model as applied to sail vessels, or steamers for the ocean, Mr. Davison states, that if the swiftest of the present transatlantic steamers had been built on his new model, with the same proportionate amount of material and cost, but in different

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shape, corresponding to his new model instead of drawing the amount of water they do, the depth of draught would be decreased one-fifth; and by the form and proportion of the model, by which the diminished draught of water is obtained, the water lines, from the greater proportionate length of keel, would have been made one-third easier, so that the diminished body of water to be displaced, would offer at least one-third less proportionate resistance to the rapid movement of the vessel than on the old model; so that by the diminished resistance of the water to the rapid movement of the vessel, a proportionate increase in the speed would be attained, by which the present transatlantic steamers, if they had been built on the new model, without any change in the machinery, could have been run across the Atlantic on an average of at least two days less time than now required—thereby saving the consumption of fuel for two days, with increased capacity for cargo—saving the interest on the capital invested—saving expense in transporting passengers —saving of time of the passengers, and adding greatly to their comfort by shortening what is commonly a tedious voyage, even on the fleetest steamer; together with the advantage of securing full freight and a full number of passengers and mails, by the speed of the vessel, advantages which, when taken in the aggregate, would amount to a saving in various ways in this country alone (to say nothing of Europe) of millions, annually. This same proportionate advantage applies to clipper ships, steamboats for rivers or lakes, and, in fact to all vessels, whether for speed or burden, large or small. * *

His vessels have also peculiar advantages as war vessels; by their great speed, strength of structure, and peculiar form, they can be used to run other vessels down, and one large steamer, properly constructed, could destroy and sink a whole fleet without receiving any material damage. But Mr. Davison says he is not a man for war, and he leaves to others to take into consideration the peculiar advantages of the new model as applied to those purposes. * * * * * *

Notices have also appeared in several of the other newspapers and magazines in this city, and have been pretty generally copied throughout the country, and hence the general interest in our progress and success.

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